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Curriculum Vitae

Haruko Murakami Wainwright

CONTACT INFORMATION

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EDUCATION

Aug. 05–Dec. 10: University of California-Berkeley, Dept. of Nuclear Engineering

Dec. 10: Ph.D. in Nuclear Engineering

(Advisors: Professor William E. Kastenberg and Professor Yoram Rubin)

May 10: M.A. in Statistics

Dec. 06: M.S. in Nuclear Engineering (Advisor: Professor Joonhong Ahn)

Mar. 04 –Aug. 05: Graduate School of Kyoto University, Dept. of Nuclear Engineering

(Advisor: Professor Hirotake Moriyama)

Apr. 99 – Mar. 03 Kyoto University (Kyoto, Japan), Dept. of Engineering Physics

Mar. 03: B.Eng. in Engineering Physics

PROFESSIONAL POSITIONS

Jun. 14 – present: Lawrence Berkeley National Laboratory, research scientist (tenure-track)

Feb. 11 – May 14: Lawrence Berkeley National Laboratory, postdoctoral fellow

Aug. 05 – Dec. 10: University of California, Berkeley, research assistant

Mar. 04 – Aug. 05: Argonne National Laboratory, visiting graduate student program

Jan. 04 – Mar. 04: Argonne National Laboratory, Japan Atomic Energy Society international student exchange program

Jul. 03 – Aug. 03: Japanese Atomic Energy Research Institute, graduate student traineeship

Sep. 02 – Oct. 02: Schlumberger-Doll Research, summer internship

AWARDS

- 2012 Director's Achievement Awards for Exceptional Tech Transfer Achievement (as a part of the TOUGH2 development team), 2012.

- Tenth International Conference on Permafrost (TICOP) young researcher travel grant award,

2012.

- Tenth International Conference on Permafrost (TICOP) NSF travel grant award, 2012.
- Student travel fellowship for the U.S. Department of Energy, Subsurface Biogeochemical Research 5th Annual PI Meeting, 2010.
- Student travel fellowship for the U.S. Department of Energy, Environmental Remediation Science Program 4th Annual PI Meeting, 2009.
- Roy G. Post Foundation Scholarship, 2009.
- Jane-Lewis Fellowship, 2006-2007 and 2007-2008.
- Japan Atomic Energy Society international student exchange program, 2004.

JOURNAL PUBLICATIONS

- **Wainwright, H.M.**, B. Dafflon, L.J. Smith, M.S. Hahn, J.B. Curtis, Y. Wu, C. Ulrich, J.E. Peterson, M.S. Torn and S.S. Hubbard, “Identifying multiscale zonation and assessing the relative importance of polygon geomorphology on carbon fluxes in an Arctic Tundra Ecosystem”, under review, Journal of Geophysical Research, Biogeosciences.
- Bromhal, G.S., J. Birkholzer, S.D. Mohaghegh, N. Sahinidis, **H.M. Wainwright**, Y. Zhang, S. Amini, V. Gholami, Y. Zhang and A. Shahkarami, “Evaluation of rapid performance reservoir models for quantitative risk assessment”, Energy Procedia, 63, 3425-3431, ISSN 1876-6102, 2014.
- **Wainwright, H.M.**, J. Chen, D. Sassen and S.S. Hubbard, “Bayesian Hierarchical Approach for Estimation of Reactive Facies over Plume-Scales Using Geophysical Datasets”, Water Resources Research, 50, 4564–4584, doi:10.1002/2013WR013842, 2014.
- Gangodagamage, C., J. Rowland, C. Wilson, S. Hubbard, S. Brumby, **H.M. Wainwright**, A. Liljedahl, G. Altmann, C. Tweedie, S. Wullschleger, “Predicting Active Layer Thickness Using Statistical Learning from Remotely Sensed High-Resolution Data in Arctic Permafrost Landscapes”, Water Resources Research, 50, 6339–6357, doi:10.1002/2013WR014283, 2014.
- Pau, G. SH, Y. Zhang, S.A. Finsterle, **H.M. Wainwright** and J.T. Birkholzer, “Reduced Order Modeling in iTOUGH2”, Computers & Geosciences, <http://dx.doi.org/10.1016/j.cageo.2013.08.008>, 2013.
- **Wainwright, H.M.**, S. Finsterle, Y. Jung, Q. Zhou and J.T. Birkholzer, “Making Sense of global sensitivity analysis”, Computers & Geosciences, ISSN 0098-3004, <http://dx.doi.org/10.1016/j.cageo.2013.06.006>, 2013.
- **Wainwright, H.M.**, S. Finsterle, Q. Zhou, J.T. Birkholzer, “Modeling the Performance of Large-Scale CO₂ Storage Systems: A Comparison of Different Sensitivity Analysis Methods”, International Journal of Greenhouse Gas Control, 17, Pages 189-205, ISSN 1750-5836, <http://dx.doi.org/10.1016/j.ijggc.2013.05.007>, 2013.
- Bea, B. A., **H.M. Wainwright**, N. Spycher, B. Faybishenko, S. S. Hubbard, M. Denham, “Identifying key controls on acidic-U(VI) plume behavior at the Savannah River Site, using reactive transport modeling”, Journal of Contaminant Hydrology, 151, 34-54, ISSN 0169-7722, <http://dx.doi.org/10.1016/j.jconhyd.2013.04.005>, 2013.

- Hubbard, S. S., C. Gangodagamage, B. Dafflon, **H.M. Wainwright**, J. E. Peterson, A. Gusmeroli, C. Ulrich, Y. Wu, C. Wilson, J. Rowland, C. Tweedie and S.D. Wullschleger, “Quantifying and relating land-surface and subsurface variability in permafrost environments using LiDAR and surface geophysical datasets”, *Hydrogeology*, Feb2013.doi: 10.1007/s10040-012-0939-y, 2013.
- Chen, X., **H. Murakami**, M.S. Hahn, G. Hammond, M.L. Rockhold and Y. Rubin, “Bayesian geostatistical aquifer characterization at the Hanford 300 Area using tracer test data”, *Water Resour. Res.*, 48, W06501, doi:10.1029/2011WR010675, 2012.
- **Murakami, H.**, X. Chen, M.S. Hahn, Y. Liu, M.L. Rockhold, V.R. Vermeul, J.M. Zachara, and Y. Rubin, “Bayesian approach for three-dimensional aquifer characterization at the Hanford 300 area”, *Hydrol. Earth Syst. Sci.* 7, 2017–2052, 2010.
- Rubin, Y., X. Chen, **H. Murakami**, M. Hahn, “A Bayesian approach for inverse modeling, data assimilation and conditional simulation of spatial random fields”, *Water Resour. Res.*, 46, W10523, doi:10.1029/2009WR008799, 2010.
- **Murakami, H.**, J. Ahn, “Development of compartment models with Markov-chain processes for radionuclide transport in repository region”, *Annals of Nuclear Energy*, 38 (2-3), 511-519, 2010, doi: 10.1016/j.anucene.2010.09.013, 2010.
- I. Kanno, S. Hishiki, **H. Murakami**, O. Sugiura, Y. Murase, T. Nakamura, M. Katagiri, “Schottky and pn Junction Cryogenic Radiation Detectors Made of p-InSb Compound Semiconductor”, *Nucl.Inst.Meth.A* **520**, page 93-95, 2004.

OTHER PUBLICATIONS

- **Wainwright, H.M.**, S. Molins, J.A. Davis, B. Arora, B. Faybishenko, H. Krishnan, S. Hubbard, G. Flach, M. Denham and C. Eddy-Dilek, J.D. Moulton, K. Lipnikov, C. Gable, T. Miller and M. Freshley, “Using ASCEM Modeling and Visualization to Inform Stakeholders of Contaminant Plume Evolution and Remediation Efficacy at F-Basin Savannah River, SC”, Proceedings of WM2015 Conference, March 15 – 19, 2015, Phoenix, Arizona, USA.
- Quinn, N., **H. M. Wainwright**, P. Jordan, Q. Zhou, J. Birkholzer, “Potential Impacts of Future Geological Storage of CO₂ on the Groundwater Resources in California’s Central Valley Simulations of Deep Basin Pressure Changes and Effect on Shallow Water Resources”, California Energy Commission. Publication number: CEC-500-2014-028.
- Houseworth, J., **H.M. Wainwright**, J. Birkholzer, “Assessment of Decoupling Wellbore Leakage from Reservoir Flow in Reduced-Order Models”, NRAP-TRS-III-001-2013, NRAP Technical Report Series, U.S. Department of Energy, National Energy Technology Laboratory: Morgantown, WV, 2013.
- **Wainwright, H.M.**, S. Finsterle, Q. Zhou, J.T. Birkholzer, “Improved Understanding of Global Sensitivity Analysis: Applications to CO₂ Storage Systems”, Proceedings of Modflow and More Conference, Golden, Colorado, 2013.
- Freshley, M., Hubbard, S., **H.M. Wainwright** et al., “Advanced Simulation Capability for Environmental Management (ASCEM) Phase II Demonstration”, ASCEM-SITE-2012-01, 2012.
- **Wainwright, H.M.**, S. Finsterle, Q. Zhou, and J. Birkholzer, “Modeling the Performance of Large-Scale CO₂ Storage Systems: A Comparison of Different Sensitivity Analysis Methods”,

NRAP-TRS-III-002-2012, NRAP Technical Report Series, U.S. Department of Energy, National Energy Technology Laboratory: Morgantown, WV, 2012.

- **Wainwright, H.M.**, S. Finsterle, Q. Zhou, Y. Jung and J. Birkholzer, “iTough2 Global Sensitivity Analysis Module: Applications to CO₂ Storage Systems”, Proceedings of TOUGH Symposium 2012, Lawrence Berkeley National Laboratory, Berkeley, California, September 2012.
- **Wainwright, H.M.**, Hubbard, S.S., Dafflon, B., Ulrich, C., Wu, Y., Gangodagamage, C., Rowland, J., Wilson, C., Tweedie, C., Wullschleger, S.D., “Multiscale Bayesian fusion approach using geophysical and remote sensing data for characterizing arctic tundra hydrogeochemical properties”, Proceedings of Tenth International Conference on Permafrost, Salekhard, Russia, 2012.
- **Murakami, H.** and J. Ahn, “Development of Compartment Models for Radionuclide Transport in Repository Region”, Proceedings of the 12th International High-Level Radioactive Waste Management Conference, Las Vegas, Nevada, 2008.
- J. Li, **H. Murakami**, Y. Liu, P.E.A. Gomez, M. Gudipati, and M. Greiner, “Peak Cladding Temperature in a Spent Fuel Storage or Transportation Cask”, Proceedings of the 15th International Symposium on the Packaging and Transportation of Radioactive Materials, PATRAM 2007.

PRESENTATIONS

- **Wainwright, H.M.**, S. Molins, J.A. Davis, B. Arora, B. Faybushenko, H. Krishnan, S. Hubbard, G. Flach, M. Denham and C. Eddy-Dilek, J.D. Moulton, K. Lipnikov, C. Gable, T. Miller and M. Freshley, “Using ASCEM Modeling and Visualization to Inform Stakeholders of Contaminant Plume Evolution and Remediation Efficacy at F-Basin Savannah River, SC”, Proceedings of WM2015 Conference, Phoenix, USA, March 2015 (accepted).
- Wainwright, H.M., B. Dafflon, L.J. Smith, M.S. Hahn, J.B. Curtis, Y. Wu, C. Ulrich, J.E. Peterson, M.S. Torn and S.S. Hubbard, “Identifying multiscale zonation and assessing the relative importance of polygon geomorphology on carbon fluxes in an Arctic Tundra Ecosystem”, B54F-07, AGU Fall meeting, San Francisco, USA, December 2014.
- **Wainwright, H.M.**, A. Flores-Orozco, M. Bücker, B. Dafflon and K.H. Williams, “Reactive transport modeling parameterization using geophysical datasets”, Complex Soil Systems Conference, Berkeley, USA, September 2014.
- **Wainwright, H.M.**, S. Molins, J.A. Davis, B. Arora, B. Faybushenko, H. Krishnan, S. Hubbard, G. Flach, M. Denham and C. Eddy-Dilek, J.D. Moulton, K. Lipnikov, C. Gable, T. Miller and M. Freshley, “Optimizing monitoring and remediation strategies at the Savannah River Site F-Area, using the Advanced Simulation Capability for Environmental Management (ASCEM)”, Complex Soil Systems Conference, Berkeley, USA, September 2014.
- **Wainwright, H.M.**, Y. Zhang, S.A. Finsterle, J.T. Birkholzer, “Uncertainty quantification in CO₂ storage systems; impacts of different CO₂ storage scenarios”, XX. International Conference on Computational Methods in Water Resources, Stuttgart, Germany, June 2014.
- **Wainwright, H.M.**, S.S. Hubbard, B. Dafflon, C. Ulrich, J.E. Peterson, Y. Wu, M.S. Hahn,

M.S. Torn, C. Gangodagamage, J.C. Rowland, C.J. Wilson, A. Liljedahl, A. Gusmeroli, S.D. Wullschleger, "Characterizing subsurface controls on the Arctic ecosystem carbon cycling across scales using geophysical, in-situ and remote sensing datasets", C53C-06, AGU Fall meeting, San Francisco, USA, December 2013.

- Hubbard, S.S. B., Dafflon, **H.M. Wainwright**, T.K. Tokunaga, C. Ulrich, J. Jansson, M. Torn, K.H. Williams, "Characterizing Controls on Terrestrial Environment Functioning Across Scales using Geophysical Datasets (Invited)", H41L-04, AGU Fall meeting, San Francisco, USA, December 2013.

- **Wainwright, H.M.**, S. Finsterle, Q. Zhou, J.T. Birkholzer, "Improved Understanding of Global Sensitivity Analysis: Applications to CO₂ Storage Systems", MODFLOW and More conference 2013, Golden, USA D, June 2013.

- **Wainwright, H.M.**, S.S. Hubbard, C. Gangodagamage, J.C. Rowland, A. Liljedahl, A. Gusmeroli, B. Dafflon, C. Ulrich, J. Peterson, Y. Wu, C. Wilson, C. Tweedie and S. Wullschleger, "High Resolution Characterization of Heterogeneous Arctic Tundra Subsurface Properties using a Multiscale Bayesian Fusion Approach with Geophysical Datasets", B53E-0715, AGU Fall meeting, San Francisco, December 2012.

- **Wainwright, H.M.**, S. Finsterle, Q. Zhou, Y. Jung and J. Birkholzer, "iTOUGH2 Global Sensitivity Analysis Module: Applications to CO₂ Storage Systems", TOUGH Symposium 2012, Lawrence Berkeley National Laboratory, Berkeley, California, September 2012.

- **Wainwright, H.M.**, S. S. Hubbard, C. Gangodagamage, B. Dafflon, C. Ulrich, Y. Wu, C. Wilson, C. Tweedie and S. Wullschleger, "Multiscale Bayesian Fusion Approach using Geophysical and Remote Sensing Data for Characterizing Arctic Tundra Hydrogeochemical Properties", Tenth International Conference on Permafrost, Salekhard, Russia, June 2012.

- **Wainwright, H.M.**, S. Finsterle, Q. Zhou, J. Birkholzer, "Uncertainty Quantification of the CO₂ Storage System for a Hypothetical GCS Project in the Southern San Joaquin Basin in California", Conference on Computational Method on Water Resources Research (CMWR), June 2012.

- Hubbard, S. S., C. Gangodagamage, B. Dafflon, **H.M. Wainwright**, J. E. Peterson, A. Gusmeroli, C. Ulrich, Y. Wu, C. Wilson, J. Rowland, C. Tweedie and S.D. Wullschleger, "Quantifying and relating land-surface and subsurface variability in permafrost environments using LiDAR and surface geophysical datasets", EGU General Assembly, Vienna, Austria, April 2012.

- Birkholzer, J., G. Bromhal, **H. Wainwright**, Y. Zhang, G. Pau, S. Mohaghegh, S. Amini, G. Zyvoloski, "Predicting Key Reservoir Relationships for Storage Security (with Reduced Order Models)", 11th Annual Carbon Capture and Sequestration, Utilization (CCUS) Conference, May 2012.

- **Wainwright, H.M.**, D. Sassen, S.A. Bea, J. Chen and S.S. Hubbard " Reactive Facies: An Approach for Parameterizing Plume-Scale Reactive Transport Models Using Multi-Type Multi-Scale Datasets", DOE-SBR Annual Meeting, Washington D.C., April 2012.

- **Wainwright, H.M.**, D. Sassen, J. Chen and S.S. Hubbard, "Multiscale Hydrogeophysical Data Assimilation for Plume-scale Subsurface Characterization", AGU Fall Meeting H52C-06, San Francisco, December 2011.

- **Murakami, H.**, S. Finsterle, Q. Zhou and J.T. Birkholzer, "Uncertainty Quantification and

Global Sensitivity Analysis of CO₂ Migration and Pressure Buildup for a Hypothetical GCS Project in the Southern San Joaquin Basin in California”, 11th Annual Conference on Carbon Capture Utilization & Sequestration, Pittsburgh, Pennsylvania, May 2011.

- **Murakami, H.**, X. Chen, M. Hahn, M. Over, M Rockhold, V Vermeul, G Hammond, J Zachara and Yoram Rubin, “Sequential Bayesian Geostatistical Inversion and Evaluation of Combined Data Worth for Aquifer Characterization at the Hanford 300 Area”, AGU Fall Meeting, December 2010.
- Chen, X., **H. Murakami**, M. Hahn, G Hammond, M Rockhold and Y. Rubin, “Three-Dimensional Bayesian Geostatistical Aquifer Characterization at the Hanford 300 Area using Tracer Test Data”, AGU Fall Meeting, December 2010.
- **Murakami, H.**, X. Chen, M.S. Hahn, M.L. Rockhold, V.R. Vermeul and Y. Rubin, “Bayesian Geostatistical Inversion Framework for Probabilistic Risk Assessments of Groundwater Contamination”, Japan Geoscience Union Meeting, Makuhari, Chiba, Japan, May 2010.
- **Murakami, H.**, X. Chen, M.S. Hahn, Y. Liu, M.L. Rockhold, V.R. Vermeul, and Y. Rubin, “Stochastic Three-dimensional Aquifer Characterization at the Hanford 300 Area”, DOE-SBR 5th Annual PI Meeting, Washington D.C., March 2010.
- **Murakami, H.**, X. Chen, M.S. Hahn, Y. Liu, M.L. Rockhold, V.R. Vermeul, Y. Rubin, "Bayesian Geostatistical Inversion Framework for Characterizing Three-Dimensional Hydraulic Conductivity Field: An Application to the Hanford 300 Area", Waste Management symposia, Phoenix, Arizona, March 2010.
- Rubin, Y., F. de Barros, X. Chen, **H. Murakami**, M.S. Hahn, “Elements of a Comprehensive Approach for Modeling Uncertainty”, Eos Trans. AGU, 90(52), Fall Meet. Suppl., Abstract H51N-01, December 2009.
- **Murakami, H.**, X. Chen, M.S. Hahn, Y. Liu, M.L. Rockhold, V.R. Vermeul, Y. Rubin, "Three-dimensional Characterization of A High-K Aquifer at the Hanford 300 Area and Retrospective Analysis of Experimental Designs", Eos Trans. AGU, 90(52), Fall Meet. Suppl., Abstract H43F-1082, December 2009.
- Chen, X., **H. Murakami**, M.S. Hahn, M.L. Rockhold, V.R. Vermeul, Y. Rubin, "Integrating Tracer Test Data into Geostatistical Aquifer Characterization at the Hanford 300 Area", Eos Trans. AGU, 90(52), Fall Meet. Suppl., Abstract H43F-1095, December 2009.
- **Murakami, H.**, X. Chen, H. Bai, M.L. Rockhold, V.R. Vermeul and Y. Rubin, "Integrating Scale-dependent Hydrogeological Data using a Bayesian Geostatistical Framework", DOE-ERSP 4th Annual PI Meeting, Lansdowne, Virginia, April 2009.
- **Murakami, H.** and Y. Rubin, "A Bayesian Geostatistical Inversion Method for Hydrogeological Data Integration in Probabilistic Risk Assessments", Waste Management symposia, Phoenix, Arizona, March 2009.
- **Murakami, H.** and J. Ahn, “Development of Geologic Repository Models for Design and Decision Making”, 16th Pacific Basin Nuclear Conference, Aomori, Japan, 2008.
- **Murakami, H.** and J. Ahn, Development of Compartment Models for Radionuclide Transport in Repository Region, 12th International High-Level Radioactive Waste Management Conference, Las Vegas, Nevada, 2008.
- **Murakami, H.** and J. Ahn, “Compartment Model for a Geologic Repository with Stochastic

Approach”, Transactions, 95, page 173-174, Winter Meeting, Albuquerque, NM, American Nuclear Society, November 2006.

LANGUAGES

Japanese (native), English (fluent)

COMPUTER SKILLS

OS: Mac, Windows, Linux

Programming: R, MATLAB, Fortran (including parallel computing), Python

Numerical code: GSLIB, PFLOTTRAN, STOMP, TOUGH2, iTOUGH2, ASCEM

Numerical Methods: finite-difference method, finite-element method and various statistical computing methods